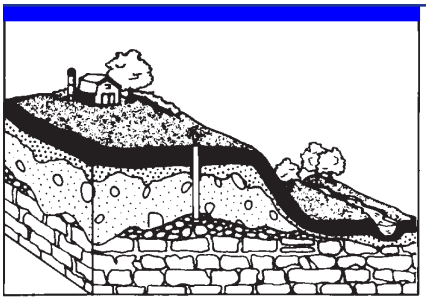

SoilFacts

How Rising Fertilizer Prices Affect Optimum Nitrogen Rates

Recent increases in nitrogen (N) fertilizer prices and current expectations about crop prices mean growers should consider reductions in fertilization rates in order to achieve maximum profits.

Nitrogen recommendations for maximum crop yield are generally based on yield potential or realistic yield expectation (RYE), which varies by soil type or productivity, climate, and various other soil and crop management factors. However, the N rate for maximum economic yield depends on the fertilizer N cost and the market price received for the crop. Historically for corn, the Crop price:N cost ratio typically has varied from 10:1 to 15:1 (i.e., a 10:1 ratio results from $2.50/bushel : $0.25/pound N). Under this range in price ratios, the N rate for maximum economic corn yield varies only slightly. However, when the N fertilizer price increases significantly and the crop price holds steady, the economic optimum N rate will decrease more. Fertilizer N rates for maximum profit are always lower than the N rates required for maximum yield.

Energy Prices and the Fertilizer N Price

The majority of commercial fertilizer N products is manufactured from anhydrous ammonia, NH_3, which is produced from reacting N_2 (nitrogen from the air) and H_2 (hydrogen from natural gas) under high pressure and temperature. Since 1999, the cost of natural gas and other energy sources has increased substantially (Figure 1).

There are two primary reasons for the recent increases in energy prices, one short term and the other longer term. Short-term increases are normally the result of significant disruption in production due to political conflicts and weather disasters. In 2005, weather in the Gulf of Mexico was the primary factor. Longer-term factors include a steady and substantial increase in foreign and domestic energy demand and a reduction in domestic oil production and refinery capacity (U.S. Department of Energy, Energy Information Administration, Annual Energy Review). In addition, the U.S. capacity to produce anhydrous ammonia has decreased approximately 50 percent since 1998. As a result, the price for N and other fertilizers has been increasing, albeit somewhat erratically (Figure 2).

Current prices for N fertilizers range from $0.30 to $0.50/pound of N, depending on the source. The main sources are anhydrous ammonia, urea, ammonium nitrate, and urea-ammonium nitrate solutions such as UAN-30; the price per pound of N varies substantially among these sources. Because each source has a different concentration of N, it pays to compare them on the basis of the per-pound cost of N. Anhydrous ammonia contains 82 pounds of N per 100 pounds of product; ammonium nitrate, 34 pounds; ammonium sulfate, 21 pounds; urea, 46 pounds. Liquid N

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